1:15 Light Exposure Guide for the Display of Museum Objects

Setting light exposure limits for the display of objects according to their levels of vulnerability is a practical strategy for maintaining a balance between the preservation and use of collections. A Light Exposure Guide should be adopted to establish appropriate limits for levels of illumination and exhibit duration thus avoiding unnecessary damage. Sample Light Exposure Guides are provided as a basis for writing Guides for specific collections.

Why is a Light Exposure Guide necessary?

Light exposure causes chemical changes which physically break down the microscopic structure of organic materials making them brittle and weak and often leads to visible damage, including color shifts and fading. The effects of light exposure are *cumulative* and *irreversible* which means that there is a limited amount of time that an object should be exhibited before serious photochemical deterioration occurs. The *potential* for photochemical damage can be expressed as a product of overall illumination and time:

Deterioration	is proportional to	*Level of Illumination*	times	*Exhibit Time*

This damage potential 'equation' reinforces the understanding that simply limiting illumination levels without limiting exhibit duration will not sufficiently curb the rate of photochemical deterioration. A Light Exposure Guide that incorporates limits on both light exposure and exhibit duration can be used to reach a balance between preserving an object as long as possible and making that object available to the public.

What criteria are used to define light exposure limits?

Established recommendations for eliminating harmful radiation (ultraviolet and infrared) in exhibit lighting are widespread within the museum community. Further restrictions for the display of museum material depend on many variables which differ for each institution and each exhibit. However, all Light Exposure Guides should address the following criteria [1]:

- *Inherent sensitivity of the material composition of an object* [2]
- *Object material condition* [3]
- *Level of illumination (lux)* [4]
- *Exhibit duration*

[1] Stolow, Nathan, Conservation and Exhibitions, Butterworth's, 1987, pp. 19 -21

[2] Organic materials are more vulnerable to photochemical deterioration than inorganic. Composite objects should be categorized based on their most sensitive material component.

[3] An object in poor condition should have less exposure than one in good condition. Even when following an exhibit exposure limits protocol, it is best to consult a conservator about the condition of an object before choosing it for display.

[4] There is some debate about the use of lux values to determine damage potential. For more information see article by Tim Padfield, 'The lux is an imperfect measure of photochemical potency ', The Physics of the Museum Environment, http://www.natmus.dk/cons/tp/, web-publication, 1997

A Light Exposure Guide may also include the recommendation for **object rotation** and/or **replica use** to minimize the damage caused to original collections.

Documenting exhibit lighting history

Many museums find it useful to record the amount of light exposure an object receives and use this information to guide future exhibit decisions. Ideally, a Light Exposure Guide should be used in combination with data that indicates the previous amount of light exposure an object has received. It is important to begin and maintain a Light Exposure Record for each object, to be kept in the object's record folder, thereby making it available for use by future exhibit planners. A sample of a **Light Exposure Record** shows how light exposure can be recorded for one object that is used in multiple exhibits.

An 'exposure estimate' can be made by recording:

- specific illumination levels for the object, and
- duration of the exhibit.

For example, UV filtered fluorescent lights may be used in an exhibit to illuminate a paper object at 50 lux. The exhibition is open daily for about 12 months and the exhibit lights are on for 10 hours a day. The exposure estimate for paper artifacts in this exhibit would be:

10hr/day **x** 360 days **x** 50 lux = **180,000 lux** (total exposure estimate for exhibit).

Always use the same form of measurement when recording, *either* lux *or* foot-candles (remember, *5 foot-candles = 50 lux).*

Examples of guides used for limiting light exposure

It is useful to see examples from other institutions when writing a Light Exposure Guide. The following examples are tailored to the collections exhibited by each museum, but may aid in writing custom Light Exposure Guides for specific collections.

These institutions not only set daily exposure parameters, but cumulative maximum exposures, beyond which an object should not be exhibited. The attached examples include light exposure limit recommendations for general object categories, for general paper-based artifacts, and for specific classifications of photographic materials:

1. ***Light Duration Guidelines for Exhibited Works of Art***
   The Arthur M. Sackler Gallery and Freer Gallery of Art, Smithsonian Institution

2. ***Conservation Working Guidelines for Light Exposure in Exhibitions and Loans***
   The U.S. National Archives

3. ***Guidelines for Exhibition Light Levels for Photographic Materials***
   Private-sector conservation consulting firm